CUSTOM-BUILT. BUILT TO LAST.

User's Manual



LH2 Fixed Position 2D Imager

25-ULH2R101-01 Preliminary

This version of the manual supports firmware 2232 and greater.

Release date: Mar 05

Statement of Agency Compliance

The LH2 has been tested for compliance with FCC regulations and was found to be compliant with all applicable FCC Rules and Regulations.

IMPORTANT NOTE: To comply with FCC RF exposure compliance requirements, this device must not be co-located or operate in conjunction with any other antenna or transmitter.

CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The LH2 has been tested for compliance to CE standards and guidelines and was found to conform to applicable CE standards, specifically the EMC requirements EN 55024, ESD EN 61000-4-2, Radiated RF Immunity EN 61000-4-3, ENV 50204, EFT EN 61000-4-4, Conducted RF Immunity EN 61000-4-6, EN 55022, Class B Radiated Emissions, and Class B Conducted Emissions.



The LH2 can be set to use targeting lasers. If the targeting lasers are activated, do not stare into the beams. The LH2's targeting lasers have been rated as Class IIa Lasers by IEC 60825-1.

The LH2 has been tested by an independent electromagnetic compatibility laboratory in accordance with the applicable specifications and instructions.

LH2 User's Manual

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Organization of this Manual

This manual provides the necessary instructions for installing and using an Opticon LH2 Fixed Position Imager. The manual is organized as follows:

Chapter 1 **Introduction and Getting Started**
Describes the general operation of a LH2 Fixed Position Imager. Also provides a Quick Start-Up Procedure that allows you to begin using the imager immediately.

Chapter 2 **Technical Specifications**
Provides complete specifications, including mechanical details, optical performance, RS232 communications and other technical data.

Chapter 3 **Positioning the Imager for Optimal Performance**
Provides detailed instructions and tips for mounting and positioning the imager to obtain the best scanning performance. Application Notes describe guidelines for maximizing specific characteristics.

Chapter 4 **Configuring the Imager**
Describes how various parameters can be programmed to customize the imager for your specific application.

Chapter 5 **Application Engineering Support**
Discusses the most common questions and concerns when adapting a LH2 Fixed Position Imager in your application.

Chapter 6 **Imager Servicing and Maintenance**
Discusses the LH2 Fixed Position Imager warranty, maintenance and cleaning procedures.

Appendices **Detailed Supporting Information**
Provides detailed information in specific areas such as the programming commands for configuring various parameters of the LH2 Fixed Position Imager.



Chapter 1

Introduction and Getting Started

Product Overview

The LH2 fixed position imager is truly a revolutionary new 2D imager. The omnidirectional decoding allows the reading of linear, stacked linear and matrix bar codes in any orientation.

These state-of-the-art imagers with superior 32-Bit, 400 mHz microprocessors provide a one piece solution combining illumination, imaging and decoding in an extremely small package.

Dual optics used by the 1.3 million pixel SXGA (1280 x 1024) CMOS sensor provide exceptional depth of field. The near and far field cameras can be programmed to be switched ON and OFF in different combinations to tailor the reading capabilities of the LH2 to fit your applications.

The laser beam facilitates targeting. The adjustable targeting zone allows precise selection of specific bar codes in the field of view. The LH2 can be customized with advanced logic through the internal embedded application engine. The embedded engine may be utilized to intelligently process or manipulate scanned data before it is sent to an application.

Advanced functions such as Barcode Readability Index provide quantitative measures for optimizing imager settings to realize maximum performance. The LH2 is rugged and built to last. These 100% solid state imagers use proven CMOS technology, assuring continuing performance and high reliability. It is designed for rough handling in tough environments and has a small footprint to fit into tight spaces.

The LH2 is available in standard RS232 interface. Custom mounting options, cable lengths, connector types and pinouts are available.

Quick Start-Up Procedure

This section is for those who wish to start using the imager before reading the complete manual. In only a few steps the imager will be operable.

Follow the appropriate steps depending upon whether your LH2 is configured to operate with a RS232 interface.

Turn off the power to your PC and connect the imager to the RS232 communications port depending on your cable configuration.

Note: You must provide +5 Volt DC power to the imager. This can be accomplished using the power supply available from Opticon. If the power supply is obtained from another source verify that it is identified with the CE mark. Turn on the power to the PC.

1) If you are operating in a Microsoft Windows 95/98/ 2000/ XP environment, you can set the communication parameters using Hyper Terminal as follows:

• Open Hyper Terminal.

This can be done from Start>Programs>Accessories> Communications

• Select Hypertrm.exe to create a New Connection

• In the Connection Description dialog screen enter a name for the new file. If desired, select an Icon. Click OK

• In the Connect To (Phone Number) dialog screen, in the box entitled: Connect using. Select the communication port, for example, "Direct to Com 1" Click OK

• In the Com 1 Properties screen, enter the appropriate Port Settings:

Bits per second = 57600

Data bits = 8

Parity = None

Stop Character = 1

Handshaking = None

Click OK

• The hyper-terminal folder you just created will open. From the File pull-down menu, select Properties then click on the Setting Tab

• In the Properties Settings dialog screen, Select Terminal keys for the Function, arrow and control key; then Select ANSI for Emulation; the Back scroll buffer line can remain at the default 500

• Click on the ASCII Setup button. In the ASCII Setup screen, select Echo typed locally so that any keyboard commands you input will appear on your screen. Click OK. This returns you to the Properties Setting. Click OK

2) Your PC and the imager should now communicate.

3) To verify that the imager and the PC are communicating properly, send the following command from your PC keyboard to receive a response from the imager.

Send these commands and at the end of the command send a carriage return.

(<┘ represents a carriage return)

;>PA7**<┘**

I**<┘**

Note: Be sure to use capital letters, e.g. "I", not "i".

4) The LH2 will send back the firmware version of the Imager.

Example:

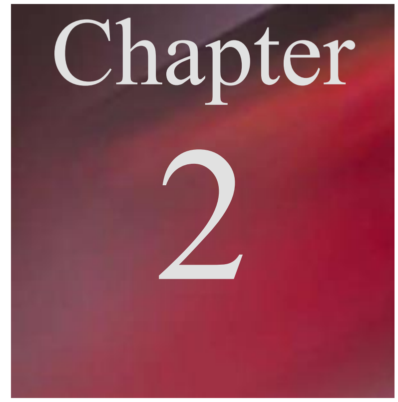
Xap/i22322230060000100002363A06 sd+sq

5) Send the following command to turn OFF the serial command mode.

PA8**<┘**

This Quick Start-Up procedure will get you started. However, to best understand the full capabilities of this imager, you should read the complete manual.

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Chapter 2

Technical Specification

OPTICAL

Field of View	21º horizontal x 15º vertical (approx)
Optical Resolution	1024 x 1280
Bar Code Density	
Linear	0.11 mm (4.2 mil) minimum
2D	0.15 mm (5.8 mil) minimum
Min. PCS Value	0.35
Pitch	±60º
Skew	±60º
Rotation	±180º

ELECTRICAL

Voltage	2.5 to 5.5 VDC
Current	
Operating	140 mA
Standby	3 mA
Maximum	310 mA
Interface	RS232

ENVIRONMENTAL

Temperature	
Operating	0º to +40º C (+32º to +104º F)
Storage	-20º to +60º C (-4º to +140º F)
Humidity	5 - 95% RH non-condensing
Shock	Withstands multiple drops to concrete of 2 m (6.56 ft)
Regulatory	FCC Class B, CE Certified
Targeting Beam	Class IIA Visible Laser Diode (630 nm)

PHYSICAL

Case Material	PC/ABS Plastic
Dimension (L x W x H)	118 x 51 x 40 mm (4.6 x 2 x 1.6 in)
Weight	136 g (4.8 oz)
Cable Length	
RS232	1.8 m (6 ft) straight

SYMBOLOGIES

2D BAR CODES	MaxiCode, PDF417, Data Matix, QR Code, MicroPDF, UCC RSS Composite, Aztec Code
LINEAR BAR CODES	Code 39, Code 128, UPC/EAN/JAN, I 2 of 5, Codabar (NW7), Code 93, UCC RSS, POSTNET, PLANET, Japanese Post, Australia Post

PINOUTS

9 Pin Female mini-DIN Connector

Pin	Function
1	Trigger
2	SD
3	RD
5	Signal Ground
9	+5 VDC

ORDERING INFORMATION

Part No.	Description
LH2RRIS-056	LH2, RS232 Interface
LH2-R1-SK1	Developers test and evaluation kit

* Additional industry standard configuration mounting brackets available.

Developer's Test and Evaluation Kit is available that contain all the items needed to install and evaluate the LH2 imager.

The LH2-R1-SK1 kit includes:

• LH2 Imager

• Cable (Connects LH2 to the Evaluation Board)

• Engineering Test & Evaluation Board

• 5V Power Supply

• Extension Cable (Connects host PC to Evaluation Board)

• User Manual

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Chapter
3

Chapter 3

Positioning the Imager for Optimal Performance

Achieving Optimum Performance

Four items greatly impact performance:

1) Distance (from the scan window) to the bar code

2) Specular Reflection; and

3) Quality of Bar Code Labels

4) Imager field of view and resolution

1) Distance to the Bar Code

The operation of the imager is similar to a camera. If you photograph an object that is out of focus, the resulting picture will be blurry. The same is true with the imager. If the bar code label is out of focus, the imager may have difficulty decoding what appears to be fuzzy bars and spaces.

Focal Distance

Ideally, the distance from the window of the imager to the bar code label should be equal to the focal distance of the imager.

Depth-of-Field

Just as with a camera, the imager has a depth-of-field. It can read bar codes that are not precisely at the focal distance - maybe a little closer, or a little farther away. However, if the bar code label is positioned too far from the focal distance, the imager may not be able to successfully decode it.

The depth-of-field varies based on the density of the bar code, i.e., the thickness of the bars. Very high density bar codes (which have very narrow bars) are readable over a

much shorter distance range than low density bar codes with larger bars.

The following chart in figure 3.1 shows the "typical" depth-of-field (closest to farthest reading distances) for the LH2 imagers. The actual performance may differ slightly from unit to unit. Also, it is important to note that this data was measured under ideal conditions using high quality bar code labels. In a "real world" environment the conditions will not be as ideal. Therefore, the best practice is to position the imager at its focal distance rather than at the extremes of its depth-of-field.

The chart also shows the field-of-view at various distances from the window. The field-of-view is the maximum width that the imager is capable of reading. A bar code label positioned anywhere within this field-of-view can be decoded. The field-of-view is also a measure of the widest bar code label that can be read. Remember: The width of a bar code label includes not only the bars and spaces but also the required white space (quiet zone) on each end.

Good design policy is to position the imager at its focal distance and at the center of the field-of-view. Do not position it near the extremes of the reading range.

LH2 Decode Zone

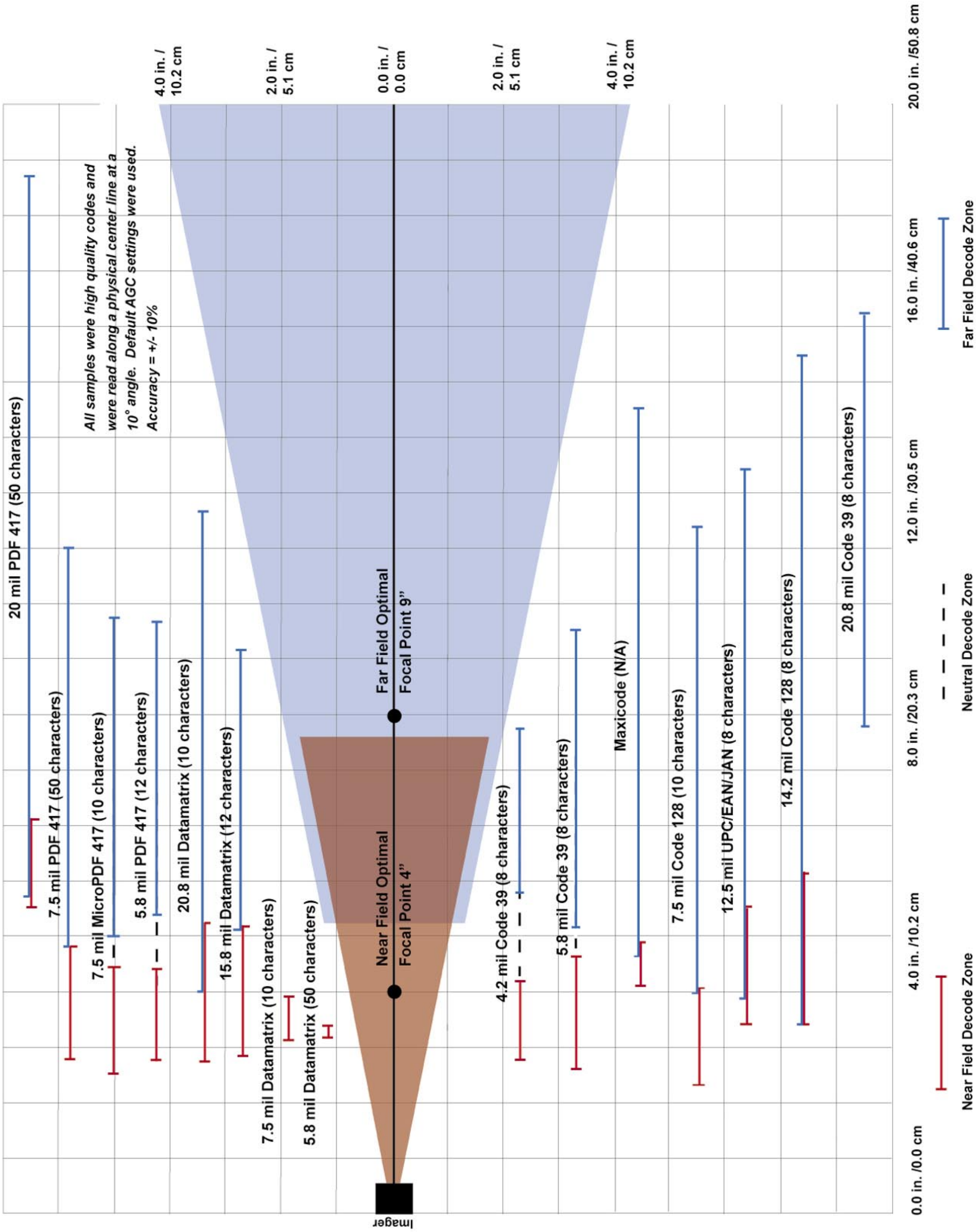


Figure 3.3

2) Avoiding Specular Reflection

Do not position the imager at an angle that causes the LED illumination to be reflected directly back into the imager. This is called specular reflection. Too much reflected light can "blind" the imager preventing a good decode.

If the bar code label is located on a flat surface, specular reflectivity occurs between 0 to 10 degrees off perpendicular. (See diagram) If the bar code label is located on a cylindrical surface, such as a test tube, the angle of specular reflection is measured tangent to the curve. If the curved surface is also moving, there may be more than one position causing specular reflection.

3) Quality Bar Code Labels

The quality of the bar code label can affect the scanning performance. Poor quality labels are more difficult to decode and may result in non-reads or potential misreads. The bar code label should be printed to specifications. This means that the bars are printed within spec, with the correct widths, no ink spread, crisps edges and no voids. There should be a sufficient quiet zone on both end of the bar code label. For best results, the paper or label stock should have a matte finish to diffuse light. The print contrast signal (which is a comparison of the reflectance of the bars and the background stock) should be as high as practical.

Barcode Readability Index

The Readability Index provides a measurement of a specific symbol's ease or difficulty to be decoded by the LH2. The Readability Index is specific to the LH2, and should not be confused with a verification quality measurement.

The Readability Index is a blend of information obtained from the internal operations of the decoding algorithm pertaining to contrast, symbology construct, error detection, forward error correction (if applicable), and other symbology-specific characteristics.

The Readability Index is a score on a scale of 01 (very poor) to 100 (very readable). Due to differences based on motion, skew, reflection, focus, and ambient lighting, the Readability Index on the same symbol may vary somewhat from read to read. However, a poor contrast or damaged symbol will score lower than a high contrast undamaged symbol. The Readability Index can be used as a quick check on the reliability of label generation or marking systems. When determining the ideal distance from the reader to the symbol, and constant ambient light, the Readability Index provides a symbol quality assurance tool and check point for feedback to an overall label or marking quality control system.

The Readability Index is enabled by first reading a CodeXML rule into the permanent LH2 Memory.

Code Readability Index Rule:

M061_01

The Reader will store the rule and reset, but will not output the Readability Index until the Readability Index Output Enable code is read. To remove this rule, scan the Clear All Prefix & Suffix code in Appendix A.

Readability Index Output Enable

M062_01

Once read, each time a data symbol is read, the index will be output, followed by a comma, (,) followed by the decoded data.

Example:

Code Qual = 98,   071589812308

The Reader will continue to output the Readability Index upon every read until disabled, either by reset or by reading the Readability Index Output Disable.

Readability Index Output Disable

M063_01

4) Imager Field of View & Resolution

The LH2's dual field optical system may be modified based on your scanning environment. The LH2's mega pixel imager may be set to the following two modes:

SXGA Mode: In standard SXGA mode (default), the 1.3 Million Pixel imager is divided into near field and far field decode zones. In each zone the resolution is 1024 x 640 pixels (see figure 3.2). In this mode of operation, the highest resolution, and therefore, widest working range on symbols of all densities is achieved. The trade-off is the amount of time the reader spends processing the image. This time can be reduced by optimization functions.

If only the near field is used (small, high density symbols), the far field image can be ignored. If only the far field is used (large, lower density symbols), the near field can be ignored. Further optimization may be obtained by "windowing" the field to a smaller area. Each focal area may be narrowed by enabling the windowing feature found in Appendix A.

VGA Mode: In VGA mode (optional selection), the 1.3 Million Pixels are sampled on a 4-to-1 basis. This greatly reduces the amount of time necessary for the transfer of the image to the CPU and the resulting processing time (figure 3.3). The trade-off for this increased speed is a reduction in resolution and working range.

NOTE: In the following section the LH2 can ONLY be programmed by scanning the bar codes. For detail serial commands read the Appendix A - Optimization Matrix section.

SXGA Imaging Area

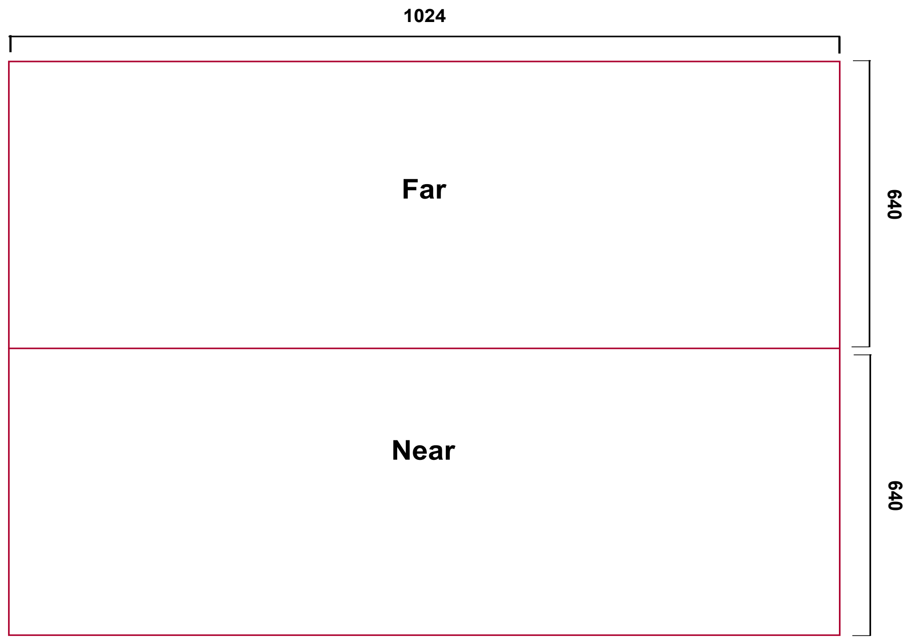


Figure 3.2

VGA Imaging Area

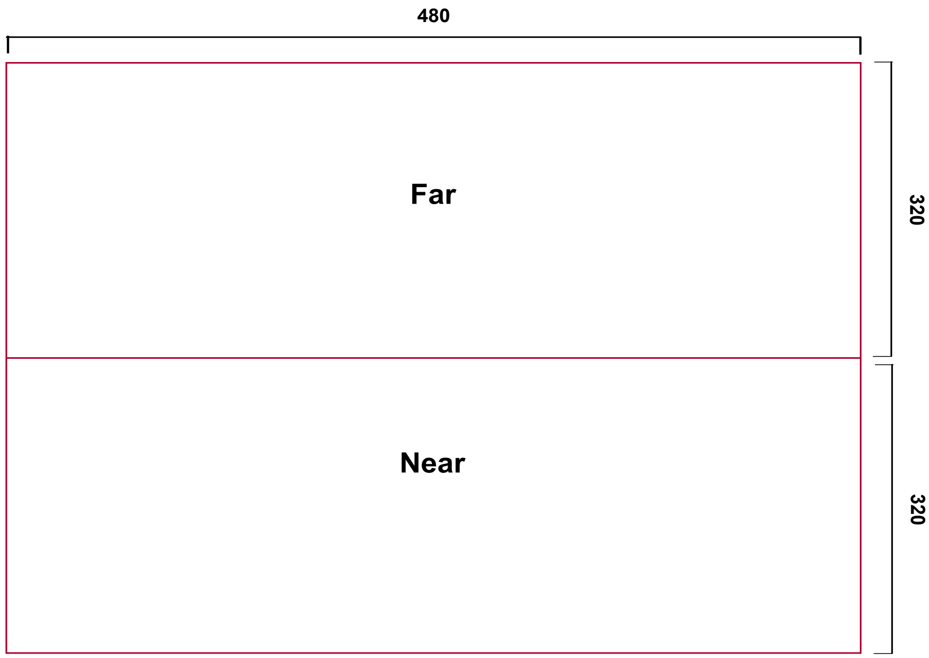


Figure 3.3

The LH2 may be easily optimized for any workplace. By setting a few parameters from your scanning environment you can take advantage of the readers dual path 1.3 mega pixel imager and 400 MHz processor.

If you are scanning large barcodes, small barcodes or even multiple sizes of different barcodes, by defining the working range and the type of symbols the reader must process, the LH2 will offer lightning fast decodes.

Look at the charts below to assess your environment. You may program each trigger on the LH2 unit for a different environment by scanning barcodes from the next few pages.

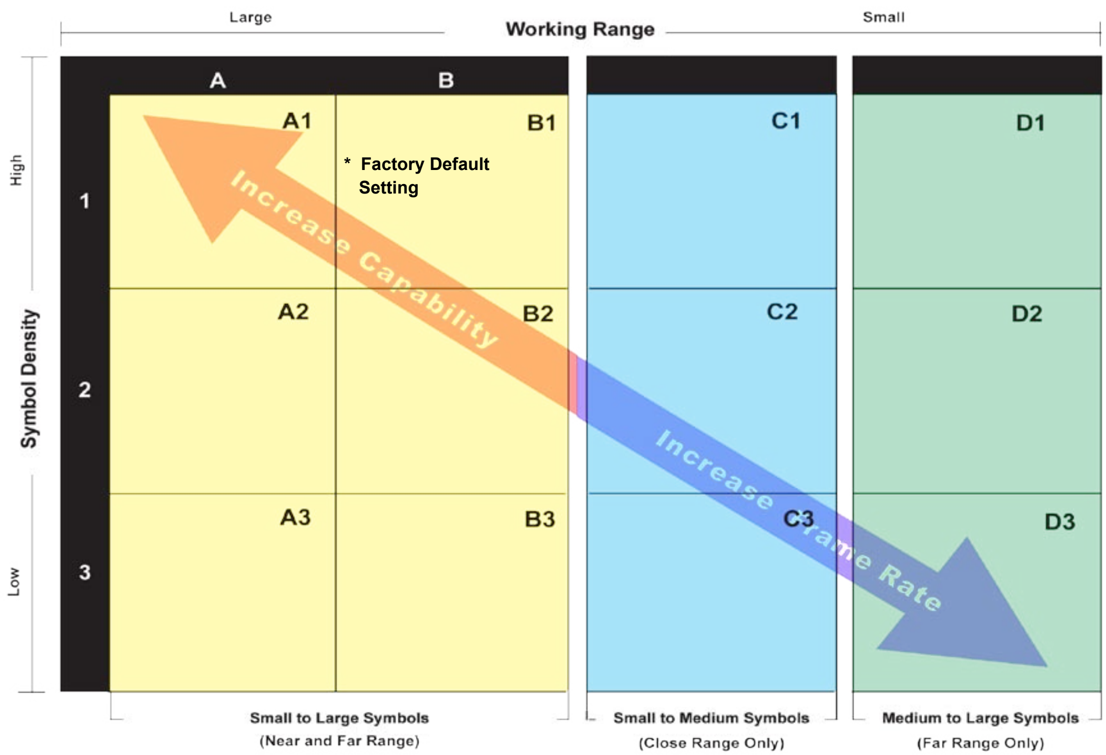


Figure 3.4

* All triggers programmed to this setting at shipment

Symbol Size - Here are a few approximate examples of large, medium and small symbols.

All of the codes below have been modified for representation purposes and do not scan.

Large Symbols

PDF 417 - 20+ mil | **Code 128** - 14.2+ mil | **Data Matrix** - 15+ mil | **QR Code** - 15+ mil

Medium Symbols

PDF 417 - 15+ mil | **UPC/EAN/JAN** - 12.5+ mil | **Data Matrix** - 10+ mil

Small Symbols

MicroPDF 417 - 7.5+ mil | **Code 39** - 4.2+ mil | **Data Matrix** - 6.5+ mil

When choosing the correct setting for your environment (i.e. printed labels, direct marks...) we recommend trying several settings. For a large majority of users, the B1 or B3 settings are satisfactory. If you would like to greatly improve the reader's performance on medium to large 1-D codes, try the D1 or D3 setting, The chart and definitions below will help you understand the readers configuration for each setting.

Working Range: Large → Small

Symbol Density: High → Low

	A	B	C	D
1	**A1** **SXGA Mode** **Near Field Decoding:** On **Far Field Decoding:** On **NF Resolution:** 1024 x 640 **FF Resolution:** 1024 x 640 **Decode Try Time:** Long	**B1** **SXGA Mode** **Near Field Decoding:** On **Far Field Decoding:** On **NF Resolution:** 1024 x 640 **FF Resolution:** 1024 x 640 **Decode Try Time:** Normal * **Factory Default Setting**	**C1** **SXGA Mode** **Near Field Decoding:** On **Far Field Decoding:** Off **NF Resolution:** 1024 x 640 **FF Resolution:** NA **Decode Try Time:** Normal	**D1** **SXGA Mode** **Near Field Decoding:** Off **Far Field Decoding:** On **NF Resolution:** NA **FF Resolution:** 1024 x 640 **Decode Try Time:** Normal
2	**A2** **SXGA Mode** **Near Field Decoding:** On **Far Field Decoding:** On **NF Resolution:** 832 x 640 **FF Resolution:** 1024 x 640 **Decode Try Time:** Normal	**B2** **SXGA Mode** **Near Field Decoding:** On **Far Field Decoding:** On **NF Resolution:** 640x 512 **FF Resolution:** 832 x 640 **Decode Try Time:** Short	**C2** **SXGA Mode** **Near Field Decoding:** On **Far Field Decoding:** Off **NF Resolution:** 640 x 640 **FF Resolution:** NA **Decode Try Time:** Normal	**D2** **SXGA Mode** **Near Field Decoding:** Off **Far Field Decoding:** On **NF Resolution:** NA **FF Resolution:** 832 x 512 **Decode Try Time:** Normal
3	**A3** **SXGA Mode** **Near Field Decoding:** On **Far Field Decoding:** On **NF Resolution:** 480 x 480 **FF Resolution:** 640 x 480 **Decode Try Time:** Short	**B3** **VGA Mode** **Near Field Decoding:** On **Far Field Decoding:** On **NF Resolution:** 480 x 320 **FF Resolution:** 480 x 320 **Decode Try Time:** Short	**C3** **VGA Mode** **Near Field Decoding:** On **Far Field Decoding:** Off **NF Resolution:** 480 x 320 **FF Resolution:** NA **Decode Try Time:** Short	**D3** **VGA Mode** **Near Field Decoding:** Off **Far Field Decoding:** On **NF Resolution:** NA **FF Resolution:** 480 x 320 **Decode Try Time:** Short
	Small to Large Symbols **Near and Far Range**		**Small to Medium Symbols** **(Close Range Only)**	**Medium to Large Symbols** **(Far Range Only)**

*** All triggers programmed to this setting at shipment**

Definitions

Symbol Density: The amount of information versus the total area occupied by the symbol. In order to achieve high density, the individual elements of a symbol must shrink. The highest density symbols can only be resolved in the LH2 near-field image, where the resolution of the imager is 1024 x 640 DPI. Symbol density is usually expressed in "Mils" - ie, thousandths of inches. This size refers to the smallest width of a linear barcode or the "cell size" (individual square) in a matrix barcode.

Working Range: The range from nearest to farthest that the object (the target symbol) can be resolved and decoded. Parameters that effect working range are SYMBOL DENSITY and the OVERALL SIZE of the symbol, the SYMBOLOGY used, the reflectivity of the surface, the contrast of the symbol in relation to its background, the amount and type of illumination available, and other environmental factors.

Resolution: Resolution is expressed in the table is the pixel array available for decoding a

symbol. It affects both the density and the size of the barcode that can be decoded.

Near Field (NF): The nearest field of the LH2's two image fields. The Near Field has the highest resolution (1024 x 640 DPI). It has an optimal focal point of 4" (101.6 mm) away from the lens of the reader. It has a size of 8.5" long (215.9 mm) by 4" wide (101.6 mm). It has an overall viewing angle of 21° x 12°.

Far Field (FF): The farthest field of the LH2's two image fields. The Far Field has the lowest resolution (480 x 320 DPI). It has an optimal focal point of 9" (228.6 mm) away from the lens of the reader. It has a size of 4" wide (101.6 mm) at the optimal focal point.

Frame Rate: The number of decode attempts in a given amount of time.

Decode Try Time: The speed of decoding a given symbol. The time of decoding is dramatically affected by the number of attempts at decoding images (frame speed) available. An attempt includes the time used in the photographic exposure of an image, and includes the transfer of the image to the CPU and the time taken to analyze the image, locate a symbol, and decode the symbol into data or abandon the attempt because no data could be derived.

There are four different Optimization Matrix available.

1) Right & Left Key Optimization

2) Left Key Optimization

3) Right Key Optimization

4) Continuous Trigger Optimization

You can use any of the options to fine tune the scanning performance of the LH2 to fit your application.

Right & Left Trigger Optimization Matrix

Working Range: Large → Small

Symbol Density: High → Low

	A	B	C	D
1	A1 M001_01	* Factory Default B1 M004_01	C1 M007_01	D1 M010_01
2	A2 M002_01	B2 M005_01	C2 M008_01	D2 M011_01
3	A3 M003_01	B3 M006_01	C3 M009_01	D3 M012_01
	Small to Large Symbols Near and Far Range		Small to Medium Symbols (Close Range Only)	Medium to Large Symbols (Far Range Only)

* All triggers programmed to this setting at shipment.

After setting the configuration, you must scan the save settings code or your reader will lose its settings if the reader is powered off.

Left Trigger Optimization Matrix

Working Range: Large → Small

Symbol Density: High → Low

	A	B	C	D
1	A1 M025_01	B1 M028_01	C1 M031_01	D1 M034_01
2	A2 M026_01	B2 M029_01	C2 M032_01	D2 M035_01
3	A3 M027_01	B3 M030_01	C3 M033_01	D3 M036_01
	Small to Large Symbols Near and Far Range		Small to Medium Symbols (Close Range Only)	Medium to Large Symbols (Far Range Only)

Right Trigger Optimization Matrix

Working Range: Large → Small
Symbol Density: High → Low

	A	B	C	D
1	A1 M037_01	B1 M040_01	C1 M043_01	D1 M046_01
2	A2 M038_01	B2 M041_01	C2 M044_01	D2 M047_01
3	A3 M039_01	B3 M042_01	C3 M045_01	D3 M048_01
	Small to Large Symbols Near and Far Range		Small to Medium Symbols (Close Range Only)	Medium to Large Symbols (Far Range Only)

Continuous Trigger Optimization Matrix

Working Range: Large → Small
Symbol Density: High → Low

	A	B	C	D
1	A1 M079_01	B1 M082_01	C1 M085_01	D1 M088_01
2	A2 M080_01	B2 M083_01	C2 M086_01	D2 M089_01
3	A3 M081_01	B3 M084_01	C3 M087_01	D3 M090_01
	Small to Large Symbols Near and Far Range		Small to Medium Symbols (Close Range Only)	Medium to Large Symbols (Far Range Only)

Application Notes

Tips for Achieving High Throughput

In some applications your primary objective may be to achieve the highest possible throughput rate. The following list identifies the parameters and imager settings that can maximize scanning and decode throughput speed. Note, by emphasizing maximum throughput, other areas of performance may be affected. For example, the number of non-reads could increase.

If high throughput is critical, consider some or all of these settings:

- Only enable those symbologies that you will be decoding.
- Eliminate all suffixes and prefixes.
- Minimize the number of redundant reads required before transmitting data.
- Transmit the decoded data at the highest baud rate, 115,200 baud.
- Disable buzzer functions.

Tips for Insuring Highest Data Integrity

There are several parameters that can enhance your confidence that the correct bar code data is transmitted. Note that by emphasizing the accuracy and security of the data other areas of the imager operation may be affected, for example, you may not achieve the highest throughput.

If accuracy and data integrity are critical, consider some or all of these settings:

- Program the imager to higher Decode Time. For example, program the imager to decode a bar code exactly the same way with Extra Long Decode Time before transmitting the data. The default settings for the LH2 are designed for optimal, general purpose performance with good quality symbols on typical surfaces. For poor quality barcodes or barcodes on non-standard surfaces (shiny, low-contrast), the unit may require more time to process the barcode before the system abandons the image and restarts on a new decode attempt. It may require manipulating LED's too.
- The quality of the printed bar code must be excellent.
- Do not use a symbology with poor internal verification, or subject to partial decodes, such as 2 of 5 or MSI/Plessey.
- Only enable those symbologies that you will be decoding.
- Transmit data at low baud rates to minimize communication errors.

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Chapter 4

Chapter 4

Configuring the Imager

Since the operation of a LH2 imager is microprocessor controlled, it is possible to modify or program its operation to match your specific application. Changes in parameter settings can be changed or programmed in two ways:

(1) The first method employs specially designed programming bar codes which instruct the imager to modify specific parameters. You can scan any of the barcodes from Appendix A to program the LH2.

(2) The imager can also be programmed by sending software instructions from the host PC to the imager via the RS232 connection only for the commands that are available.

Programming Menus & Commands

Appendix A contains full instructions on how to configure the imager as well as a complete listing of the host serial commands and programming bar codes that are available to customize the imager for your application.

Default Settings

Default settings are indicated throughout the menus to follow.

To restore the "out-of-the-box" settings shown in the following table, use the Reset to Factory defaults setting and Clear All Prefix & Suffix barcode settings

RS-232 Interface Setting Defaults

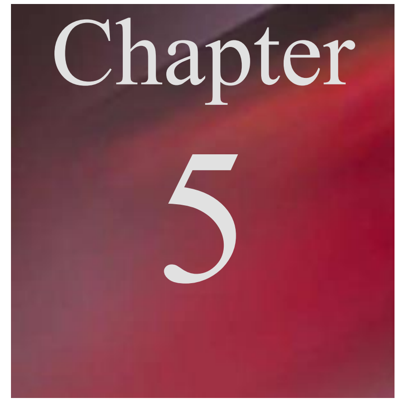
Baud Rate	57600
Stop Bits	1
Data Bits	8
Parity	None

Symbology Defaults:

All 1D Codes	ON
Aztec	OFF
Codabar	ON
Code 128	ON
Code 93	ON
Code 39	ON
Composite	OFF
Data Matrix	ON
DM Inverse	OFF
DM Rect.	ON
Interleaved 2 0f 5	ON
MaxiCode	OFF
MSIP	OFF
PDF 417	ON
Micro PDF	OFF
Postal Codes	OFF
QR	OFF
RSS	OFF
UPC	ON

Control Setting Defaults:

Left Button	All Decodes
Right Button	All Decodes
Beeper Volume	High
Laser Targeting	On
Time Stamp	Off
Continuous Scan	Off



Chapter 5

Application Engineering Support

Technical Assistance and Support

Opticon is eager to help you integrate the LH2 imager into your application. Our technical support staff is available to answer any questions or work with you to adapt the imager to your specific situation. We are happy to answer your questions, assist in configuring and positioning the imager for optimum operation, and help resolve any problems you encounter. Call us at 1 (800) 636-0090.

Common Causes of Poor Performance

The most common reasons for poor scanning performance are listed below:

- Bar codes are not positioned at the focal distance of the imager.
- Specular reflection is impacting the imager. Change the angle/position of the imager or the bar code.
- Poor quality of printed bar codes. Bar codes are out of specification.
- The paper on which the bar code is printed is highly reflective or has a glossy finish causing light to be reflected into the imager.
- The distance from the imager to the bar code is not suitable for the density of the bar code. Or the density of the bar code beyond the imagers capability.

Modified and/or Customized Imagers

Opticon will work with you to modify or customize imagers to match your requirements. Imagers can be modified in terms of connectors type, pin-outs, cable length, default settings, custom software and many other areas.

Opticon will modify imagers in our factory and ship you imagers that match your specific requirements. By incorporating your modifications directly into production imagers, you receive imagers tailored for your need. They can be used immediately without the need for further modification or rework.

Chapter 6

Chapter 6

Imager Servicing and Maintenance

The LH2 imager contains no user adjustable or serviceable parts in the interior of the imager. All product service must be performed by the Opticon Service Department in Orangeburg, NY. Opening the imager will void the warranty and could expose the operator to laser light.

⚠ **CAUTION:** The LH2 utilizes a laser for targeting purpose only. If the laser is activated, do not stare into the beam.

The LH2 is warranted for 5 years including parts and workmanship. If you need warranty or out-of-warranty repair, first **call 1-800-636-0090** to obtain a **Returned Material Authorization (RMA)** number. You will be provided a number and shipping instructions. Please visit our web site for a detail warranty statement.

http://www.opticonusa.com

There is no scheduled maintenance required for the LH2. The imager can be cleaned using a water dampened, lint free or lens cloth. Be careful to avoid excessive moisture that would penetrate the housing or obscure the window. While use of cleaning fluids other than water are not recommended, a neutral detergent or ethanol would be preferred if necessary. Do not use bleach at full or diluted strength as damage to the painted case and/or window may result.

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Appendix
A

Appendix A

Programming Menus & Commands

How to use the Appendix?

The appendix has all the programming commands laid out in a standard format in the whole section. All the programming commands have these attributes - Command Name, Usage, Description, Default, Programming Code, Note and Options. For certain commands you might not have all the attributes and are intentionally not mentioned.

Following are the details on each attributes of a programming command.

Command Name: The general name of a programming command.

Usage: A brief description of the command name and the function of the command.

Description: Here you will find a detail description on the programming command.

Default: The default setting will be mentioned here.

Programming Code:

A bar code to program the command.

Serial Command:

If a serial command is available then you can send the program the LH2 via serial port.

All the commands end with a carriage return.

<┘ represents a carriage return.

Example:

P%081<┘

Note: Extra notes on the command will be mentioned here. Usually these notes are important so please pay special attention to this section.

Options: If extra programming command options are available then it will be listed here. It follows the same syntax as mentioned in the Programming Code and Serial Command section.

Programming Bar Codes

The LH2 imagers are pre programmed at the factory with default settings representing the settings most commonly used by our customers. In most applications, the imager will work right out of the box without the need for additional programming.

You can scan the barcodes from the appendix to change the settings of the LH2. The LH2 will automatically recognize the barcode as a programming barcode and change the settings accordingly. You can scan multiple programming barcodes to change the settings.

NOTE: Always scan the “Save Settings“ bar code to save all the changes you made. If you do not save the settings then the next time you power ON the LH2, it will go to the previously saved settings.

CRB Files

The CRB file is a convenient method for creating and maintaining a set of commands that can be easily sent to the reader. The CRB files are regular text files with the .crb extension. These CRB files can be created in any text editor such as "Notepad" and saved with the file extension of .crb.

The CRB file can be sent to the reader using any standard serial program. You can use HyperTerminal Program to send the file. Please refer the topic in Chapter 1 - Quick Start-Up Procedure to set up the HyperTerminal program. After setting the connection use the Transfer pull-down menu, select "Send Text File..." (figure) and then select the file you want to send to the LH2.



The CRB file allows for combining multiple functions into a single file.

NOTE: You can comment your CRB file with a semicolon(;) as shown below.

The standard format of the CRB file is

;>PA7 ;enable programming mode

commands

commands

.

.

commands

~ ;save the settings

PA8 ;disable the programming mode

For example you can create a test.crb file that contains commands to enable Aztec symbology and make the reader beep three times. Note you can also comment your CRB file with a semicolon (;) as shown below.

NOTE: The only command which is not ignored in the CRB file when a semicolon (;) is used is ;>PA7. In all other cases anything that follows the semicolon is commented out.

Example: test1.crb

```
;>PA7       ;enable programming mode
P%501       ;enable aztec symbology
#%03        ;beep reader 3 times
~           ;save the settings
PA8         ;disable the programming mode
```

General Options

Command Name: **Reset to Factory Defaults**

Usage: Use this option to reset the imager to RS232 factory defaults.

Description: This command will set the imager to factory defaults. This command is extremely helpful if you have set the imager to different settings and want to erase those settings and reset the imager back to the factory defaults. **It does not erase the Clear Prefix & Suffix commands.**

Default: ON

Programming Code:

M418_01

Serial Command:

J<┘
P%1b1<┘
P%420<┘
P%081<┘

Note: This code does not reset the Prefix & Suffix settings to factory defaults. In order to reset the Prefix & Suffix settings to factory defaults, use the "Erase Prefix" and "Erase Suffix" commands.

Options: ---

Command Name: **Save Settings**

Usage: This command saves the current settings on the imager.

Description: Always use this command to save any the changes you make to the imager. If you change the settings on the reader and do not use this command then the imager will not save them if you turn the power OFF. The imager will default to the previously saved settings next time you power ON.

Default: ---

Programming Code:

M577_01

Serial Command:

~<┘

Note: ---

Options: ---

Command Name: **Clear All CodeXML Rules**

Usage: Clears any rules and also the prefix and suffix settings.

Description: This command will clear any special command rules and prefix or suffix settings from the imager.

Default: ---

Programming Code:

M052_01

Serial Command:

1<┘
5<┘

Notes: See the Prefix/Suffix section to clear only the prefix or suffix.

Options: ---

Command Name: **Reader ID & Firmware Version**

Usage: To find out the Reader ID and Firmware version of the imager.

Description: You will get a text string with your firmware version and LH2 ID number (see below):

Xap/iVVVVWWWWXXXXSSSSSSSSSSPXX sd+sq

Xap/i - Opticon Internal ID

VVVV is the application firmware version number (4 digits)

WWWW is the bootloader firmware version number (4 digits)

XXXX is reserved (4 digits)

SSSSSSSSSS Reader's serial number (10 digits)

P is "A" if running firmware is the application, "B" if bootLoader

XX - Opticon Internal ID

sd+sq - Reserved characters

Example:

Xap/i20982012060000010002363A06   sd+sq

Default: ---

Programming Code:

M153_01

Serial Command:

I<┘

Note: Opticon, Inc. will periodically release new firmware for LH2 units. For information on latest firmware versions, call Opticon at (800) 636-0090. To upgrade the firmware please visit Opticon web site at http://www.opticonusa.com to download the latest files.

Options: ---

Example: test2.crb

```
;>PA7      ;enable programming mode
J          ;4 line commands to reset the imager
P%1b1
P%420
P%081
I          ;check the firmware id
~          ;save the settings
PA8        ;disable the programming mode
```

On sending the test2.crb file, the LH2 will be reset to factory defaults and on your screen you will receive the Firmware ID string from the imager.

Command Name: **Barcode Readability Index**

Usage: The Readability Index provides a measurement of a specific symbol's ease or difficulty to be decoded by the LH2.

Description: The Readability Index is specific to the LH2, and should not be confused with a verification quality measurement.

The Readability Index is a blend of information obtained from the internal operations of the decoding algorithm pertaining to contrast, symbology construct, error detection, forward error correction (if applicable), and other symbology-specific characteristics.

The Readability Index is a score on a scale of 01 (very poor) to 100 (very readable). Due to differences based on motion, skew, reflection, focus, and ambient lighting, the Readability Index on the same symbol may vary somewhat from read to read. However, a poor contrast or damaged symbol will score lower than a high contrast undamaged symbol. The Readability Index can be used as a quick check on the reliability of label generation or marking systems. When determining the ideal distance from the reader to the symbol, and constant ambient light, the Readability Index provides a symbol quality assurance tool and check point for feedback to an overall label or marking quality control system.

The Readability Index is enabled by first reading a CodeXML rule into the permanent LH2 Memory.

Default: There is No Bar code Readability Index installed.

Programming Code:

M061_01

Serial Command:

Notes: The Reader will store the rule and reset, but will not output the Readability Index until the Readability Index Output Enable code is read. To remove this rule, scan the Clear All Prefix & Suffix code.

Options:

Programming Code:	***Serial Command:***
Readability Index Output Enable M062_01	P%da1<┘

Once read, each time a data symbol is read, the index will be output, followed by a comma, (,) followed by the decoded data.

Example:

Code Qual = 98,   071589812308

The Reader will continue to output the Readability Index upon every read until disabled, either by reset or by reading the Readability Index Output Disable.

Read Index Output Disable M063_01	P%da0<┘

Command Name: **Software Trigger**

Usage: Simulates a trigger.

Description: This command will post a single simulated software trigger. You can read with both the fields, only the near field or only the far field.

Default: ---

Programming Code:

(There are no programming barcodes)

Notes: See continuous trigger option.

Options:	***Serial Command:***
Read Near and Far Field	$%03<┘
Read Near Field only	$%05<┘
Read Far Field only	$%06<┘

Symbology Options

Command Name: **Aztec Symbology**

Usage: Sets the Aztec bar code symbology options.

Description: This command allows you to turn ON or OFF the Aztec 2D bar code symbology.

Default: Aztec is OFF

Programming Code:	***Serial Command:***
Aztec OFF (Default)	P%500<┘

M272_01

Options:

Programming Code:	***Serial Command:***
Aztec ON	P%501<┘

M273_01

Command Name: **Codabar Symbology**

Usage: Sets the Codabar bar code symbology options.

Description: This command allows you to turn ON or OFF the Codabar bar code symbology.

Default: Codabar is ON

Programming Code:	***Serial Command:***
Codabar ON (Default)	P%6f1<┘
M275_01	

Options:

Programming Code:	***Serial Command:***
Codabar OFF	P%6f0<┘
M274_01	

Command Name: **Codablock F Symbology**

Usage: Sets the Codablock F bar code symbology options.

Description: This command allows you to turn ON or OFF the Codablock F bar code symbology.

Default: Codablock F is OFF

Programming Code:	***Serial Command:***
Codablock ON M277_01	P%6d0<┘ P%ce1<┘

Options:

Programming Code:	***Serial Command:***
Codablock OFF (Default) M276_01	P%6d1<┘ P%ce0<┘

Note: When Codablock F and Code 128 decoding are enabled, there is some danger of mistakenly decoding a damaged Codablock F symbol as a Code 128 symbol. Therefore, whenever possible, Code 128 decoding should be disabled when Codablock F decoding is enabled.

Command Name: **Code 128 Symbology**

Usage: Sets the Code 128 bar code symbology options.

Description: This command allows you to turn ON or OFF the Code 128 bar code symbology.

Default: Code 128 is ON

Programming Code:	***Serial Command:***
Code 128 ON (Default)	P%6d1<┘

M283_01

Options:

Programming Code:	***Serial Command:***
Code 128 OFF	P%6d0<┘

M282_01

Command Name: **Code 93 Symbology**

Usage: Sets the Code 93 bar code symbology options.

Description: This command allows you to turn ON or OFF the Code 93 bar code symbology.

Default: Code 93 is ON

Programming Code:	Serial Command:
Code 93 ON (Default)	P%6c1<┘

M281_02

Options:

Programming Code:	Serial Command:
Code 93 OFF	P%6c0<┘

M280_01

Symbology Options

Command Name: **Code 39 Symbology**

Usage: Sets the Code 39 bar code symbology options.

Description: This command allows you to turn ON or OFF the Code 39 bar code symbology.

Default: Code 39 is ON
Disable Checksum is ON
Code 39 Extended Full ASCII is OFF

Programming Code:	**Serial Command:**
Code 39 ON (Default)	P%6b1<┘

M235_01

Options:

Programming Code:	**Serial Command:**
Code 39 OFF	P%6b0<┘

M234_01

Enable Checksum	P%701<┘

M237_01

Disable Checksum (Default)	P%700<┘

M236_01

Programming Code:	***Serial Command:***
Enable checksum and strip from result M238_01	P%702↵
Code 39 Extended Full ASCII ON M233_01	P%491↵
Code 39 Extended Full ASCII OFF (Default) M232_01	P%490↵

Command Name: **Composite Symbologies**

Usage: Sets the Composite bar code symbology options.

Description: This command allows you to turn ON or OFF the Composite bar code symbology.

Default: Composite is OFF

Programming Code:	***Serial Command:***
Composite ON M285_01	P%344<┘ P%4a1<┘

Options:

Programming Code:	***Serial Command:***
Composite OFF (Default) M284_01	P%4a0<┘

Command Name:	**Data Matrix Symbology**
Usage:	Sets the Data Matrix 2D bar code symbology options.
Description:	This command allows you to turn ON or OFF the Data Matrix 2D bar code symbology.
Default:	Data Matrix is ON Data Matrix Inverse is ON

Programming Code:	***Serial Command:***
Data Matrix ON (Default) M242_01	P%161<┘

Options:

Programming Code:	***Serial Command:***
Data Matrix OFF M241_01	P%160<┘
Data Matrix Inverse ON (Default) M239_01	P%193<┘
Data Matrix Inverse OFF M240_01	P%191<┘

Command Name: **Interleaved 2 of 5 Symbology**

Usage: Sets the Interleaved 2 of 5 bar code symbology options.

Description: This command allows you to turn ON or OFF the Interleaved 2 of 5 bar code symbology.

Default: I 2 of 5 is ON

Programming Code:	Serial Command:
I 2 of 5 ON (Default)	P%6e1<┘

M244_01

Options:

Programming Code:	Serial Command:
I 2 of 5 OFF	P%6e0<┘

M243_01

I 2 of 5 Two digits ON	O%c91

M246_01

I 2 of 5 Two digits OFF	Q%c90

M245_02

Programming Code:	***Serial Command:***
I 2 of 5 Four digits ON M248_01	O%c92
I 2 of 5 Four digits OFF M247_01	Q%c92

Symbology Options

Command Name: **Maxicode Symbology**

Usage: Sets the Maxicode 2D bar code symbology options.

Description: This command allows you to turn ON or OFF the Maxicode 2D bar code symbology.

Default: Maxicode is OFF

Programming Code:	***Serial Command:***
Maxicode ON	---
M569_02	

Options:

Programming Code:	***Serial Command:***
Maxicode OFF (Default)	P%470<┘
M288_01	

Note: For certain Maxicode (commonly used by UPS™) barcodes printed on thermal labels may require to manipulate the LED's on the LH2.

For more information on different settings, please refer to section "Advanced Settings" on Page 86.

Command Name: **Micro PDF 417 Symbology**

Usage: Sets the Micro PDF 417 2D bar code symbology options.

Description: This command allows you to turn ON or OFF the Micro PDF 417 2D bar code symbology.

Default: Micro PDF 417 is OFF

Programming Code:	**Serial Command:**
Micro PDF 417 ON	P%2a1<┘

M301_01

Options:

Programming Code:	**Serial Command:**
Micro PDF 417 OFF (Default)	P%c2a0<┘

M300_01

Command Name: **MSI Plessy Symbology**

Usage: Sets the MSI Plessy bar code symbology options.

Description: This command allows you to turn ON or OFF the MSI Plessy bar code symbology.

Default: MSI Plessy is OFF

Programming Code:	***Serial Command:***
MSI Plessy ON	P%4f1<┘

M291_01

Options:

Programming Code:	***Serial Command:***
MSI Plessy OFF (Default)	P%4f0<┘

M290_01

Command Name: **PDF 417 Symbology**

Usage: Sets the PDF 417 2D bar code symbology options.

Description: This command allows you to turn ON or OFF the PDF 417 2D bar code symbology.

Default: PDF 417 is ON

Programming Code:	***Serial Command:***
PDF 417 ON (Default)	P%291<┘

M293_01

Options:

Programming Code:	***Serial Command:***
PDF 417 OFF	P%290<┘

M292_01

Command Name: **Postal Symbologies**

Usage: Sets different Postal bar code symbology options.

Description: This command allows you to turn ON or OFF different Postal bar code symbologies.

Default: All Postal Symbologies are OFF.

Programming Code:	***Serial Command:***
Disable All Postal Codes (Default)	P%4b0<┘
M259_01	

Options:

Programming Code:	***Serial Command:***
Australian Post ON	P%4b8<┘
M252_01	
Japan Post ON	P%4b20000<┘
M253_01	
KIX ON	P%4b200001<┘
M254_01	
Planet ON	P%4b80<┘
M256_01	

Programming Code:	***Serial Command:***
Postnet ON M257_01	P%4b2000<┘
Postnet and Planet ON M255_01	P%4b2080<┘
Royal Mail ON M258_01	P%4b200000<┘

Command Name: **QR Code Symbology**

Usage: Sets the QR Code 2D bar code symbology options.

Description: This command allows you to turn ON or OFF the QR Code 2D bar code symbology.

Default: QR Code is OFF.
Checksum is Disabled.

Programming Code:	**Serial Command:**
QR Code ON M261_01	P%2b1<┘

Options:

Programming Code:	**Serial Command:**
QR Code OFF (Default) M260_01	P%2b0<┘
Enable Checksum M265_01	P%481<┘
Disable Checksum M264_01	P%480<┘

Programming Code:	***Serial Command:***
QR Code Inverse ON	P%2b2<┘
M262_01	
Both Inverse and Standard ON	P%2b3<┘
M263_01	

Command Name:	**RSS Symbology**
Usage:	Sets different RSS bar code symbology options.
Description:	This command allows you to turn ON or OFF different RSS bar code symbologies.
Default:	All RSS Symbologies are OFF.

Programming Code:	***Serial Command:***
All RSS Codes ON	P%4c#31↵

M267_01

Options:

Programming Code:	***Serial Command:***
All RSS Codes OFF (Default)	P%4c0↵

M266_01

RSS Limited ON	P%4c4↵

M268_01

RSS 14 and RSS 14 Truncated ON	P%4c8↵

M271_01

RSS 14 Stacked ON P%4c#16<┘

M270_01

RSS Expanded ON P%4c1<┘

M269_01

Command Name: **UPC / EAN / JAN Symbologies**

Usage: Sets the UPC/EAN/JAN bar code symbology options.

Description: This command allows you to turn ON or OFF the UPC/EAN/JAN bar code symbology.

Default: UPC is ON

UPC Short Margin is Disabled

Programming Code:	**Serial Command:**
UPC ON (Default)	P%6a1<┘
M295_01	
UPC Short Margin Disabled	P%740<┘
M298_01	

Options:

Programming Code:	**Serial Command:**
UPC OFF	P%6a0<┘
M294_01	
UPC Short Margin Enabled	P%741<┘
M299_01	

UPC Extension ON P%4d1<┘

M297_01

UPC Extension OFF P%4d0<┘

M296_01

Communication Parameters

Command Name: **Baud Rate**

Usage: Sets the RS-232 baud rate.

Description: This command allows you to set different baud rates for RS-232 communication.

Default: 57600

Programming Code:	***Serial Command:***
57600 (Default) M098_01	P%1cE100<┘

Options:

Programming Code:	***Serial Command:***
1200 M092_01	P%1c4B0<┘
2400 M093_01	P%1c960<┘

4800 P%1c12C0<┘

M094_01

9600 P%1c2580<┘

M095_01

19200 P%1c4B00<┘

M096_01

38400 P%1c9600<┘

M097_01

115200 P%1c1C200<┘

M099_01

Command Name: **Data Bits**

Usage: Sets the RS-232 Data Bits options.

Description: This command allows you to set the appropriate data bit

Default: 8 Data Bits is ON

Programming Code: ***Serial Command:***

8 Data Bits (Default) P%1e8<┘

M101_01

Options:

Programming Code: ***Serial Command:***

7 Data Bits P%1e7<┘

M100_01

Command Name: **Stop Bits**

Usage: Sets the RS-232 Stop Bits options.

Description: This command allows you to set the appropriate stop bit

Default: 1 Stop Bit is ON

Programming Code: ***Serial Command:***

1 Stop Bit (Default) P%1d1<┘

M105_01

Options:

Programming Code: ***Serial Command:***

2 Stop Bit P%1d2<┘

M106_01

Command Name: **Parity**

Usage: Sets the RS-232 Parity options.

Description: This command allows you to set appropriate parity.

Default: None is ON

Programming Code:	***Serial Command:***
None (Default)	P%220<┘

M103_01

Options:

Programming Code:	***Serial Command:***
Even	P%222<┘

M102_01

Odd	P%221<┘

M104_01

Command Name: **Beep Volume**

Usage: Sets the buzzer volume.

Description: This command allows you to set the beep volume to high or low. You can also turn off the beep for a quite operation.

Default: Beep is set to High volume.

Programming Code:	***Serial Command:***
Beep High (Default)	P%2664<┘

M112_01

Options:

Programming Code:	***Serial Command:***
Beep Low	P%2632<┘

M111_01

Beep Off	P%260<┘

M110_01

Hardware Settings

Command Name: **Laser Targeting**

Usage: Sets the targeting laser beam.

Description: This command allows you to turn ON or OFF the laser targeting beam. The laser targeting beam is extremely help full to set the imager during the initial set up. You can easily read a bar code by pointing the laser dot in the center of the bar code.

Default: Laser aiming dot is turned ON.

Programming Code:	***Serial Command:***
Laser ON (Default)	P%0f1<┘
M055_01	

Options:

Programming Code:	***Serial Command:***
Laser OFF	P%0f0<┘
M054_01	

Command Name: **Laser Brightness**

Usage: Sets the targeting laser brightness.

Description: This command allows you to change the brightness of the targeting laser.

Default: Targeting laser is set to High.

Programming Code:	***Serial Command:***
High (Default)	P%9C100<┘
M058_01	

Options:

Programming Code:	***Serial Command:***
Medium	P%9C50<┘
M057_01	
Low	P%9C1<┘
M056_01	

Command Name: **Left Key Programming**

Usage: Programs the left key to different options.

Description: This command allows you to program the left key to perform different functions. You can program the key so that it can make use of a different imager (Near / Far) to read a barcode. This function is useful while doing the initial setup.

Default: The key is set to read with Both the imagers.

Programming Code:	Serial Command:
Read with Both Imagers (Default) M178_01	P%3a3<┘

Options:

Programming Code:	Serial Command:
Read with Far-Field Imager only M176_01	P%3a6<┘
Read with Near-Field Imager only M177_01	P%3a5<┘

Hardware Settings

Command Name: **Right Key Programming**

Usage: Programs the right key to different options.

Description: This command allows you to program the right key to perform different functions. You can program the key so that it can make use of a different imager (Near / Far) to read a barcode. This function is useful while doing the initial setup.

Default: The key is set to read with both the imagers.

Programming Code:	***Serial Command:***
Read with Both Imagers (Default) M185_01	P%393<┘

Options:

Programming Code:	***Serial Command:***
Read with Far-Field Imager only M183_01	P%396<┘
Read with Near-Field Imager only M184_01	P%395<┘

Continuous Scan

Command Name: **Continuous Scan**

Usage: Sets the imager in continuous scan mode.

Description: This command allows you to set the imager into a continuous scan mode. You can program the imager so that it can make use of different imagers (Near / Far) to read a barcode in a continuous mode.

Default: Continuous Scan is OFF

Programming Code:	***Serial Command:***
Both Near & Far Field ON	P%c43<┘

M138_01

Options:

Programming Code:	***Serial Command:***
Near Field Only ON	P%c45<┘

M140_01

Far Field Only ON	P%c46<┘

M139_01

Continuous Scan OFF (Default) P%c40<┘

M141_01

Command Name: **Continuous Scan - Trigger Delays**

Usage: Sets the delay time for continuous scan.

Description: This command allows you to program the delay time between scans while in continuous scan mode.

Default: Delay is set to 0 seconds

Programming Code:	***Serial Command:***
3 Seconds	P%a2#3000<┘

M144_01

Options:

Programming Code:	***Serial Command:***
1 Second	P%a2#1000<┘

M143_01

0 Second (Default)	P%a2#0<┘

M142_01

Command Name: **Duplicate Scan Delay**

Usage: Sets the duplicate scan delay time in the continuous scan mode.

Description: This command allows you to program the delay time between scans while in continuous scan mode so that the imager will not read the same bar code again.

Default: Duplicate Scan Delay is set to 0 seconds

Programming Code:	***Serial Command:***
3 Seconds M224_01	P%d63<┘

Options:

Programming Code:	***Serial Command:***
1 Second M223_01	P%d61<┘
0 Second (Default) M222_01	P%d60<┘

Advance Settings

Command Name: **Decode Time & LED's for Non Standard Inks**

Usage: Sets the Decode Time and LED to read a bar code.

Description: The default settings for the LH2 are designed for optimal, general purpose performance with good quality symbols on typical surfaces. For poor quality barcodes or barcodes on non-standard surfaces (shiny, low-contrast), the unit may require:

- More time to process the barcode before the system abandons the image and restarts on a new decode attempt.
- May require manipulating LED's.

To allow for additional processing time or to change the LED settings for marginal symbols, use one of the following commands.

Default: Normal Decode Time is ON.
LED's for Non Standard Inks are OFF.

Programming Code: | ***Serial Command:***

Extra Long Decode Time — P%AA0200<┘

M148_01

Note: Utilizing this feature may affect the overall performance of the reader, but "unreadable" barcodes may become readable.

Options:

Programming Code: | ***Serial Command:***

Normal Decode Time (Default) — P%AA100<┘

M152_01

Short Decode Time P%aa80<┘

M217_01

Long Decode Time P%AA180<┘

M151_01

LED's for Non Standard Inks ON P%b61<┘

M150_01

LED's for Non Standard Inks OFF (Default) P%b60<┘

M149_01

Command Name: **Targeting Zone Tolerance**

Usage: Sets the Targeting Zone Tolerance of the imager.

Description: This command allows you to program the decode accuracy of the LH2. The 50 setting is the most accurate while the 1600 barcode is the most tolerant. If you set the unit to a 50 setting, you have to aim the targeting dot directly on the desired barcode for it to be read. This setting is helpful when you are trying to read a single bar code amongst a group of bar codes on a label.

Default: Targeting Zone Tolerance is set to 1600.

Programming Code:	**Serial Command:**
50	P%9d32<┘
M189_01	

Options:

Programming Code:	**Serial Command:**
1600 (Default)	P%9d640<┘
M196_01	
75	P%9d4b<┘
M190_01	

100 P%9d64<┘

M191_01

125 P%9d7d<┘

M192_01

150 P%9d96<┘

M193_01

200 P%9dc8<┘

M195_01

400 P%9d190<┘

M194_01

Command Name: **Windowing**

Usage: Sets the imaging window size.

Description: You may optimize the LH2 decode zone if the application only requires one barcode format. If the size and density of the barcodes to be scanned are consistent, please select the setting below that best describes your environment.

Default: The window size is set to 640 x 1024 pixels

Programming Code:	***Serial Command:***
1D & 2D Bar Codes 640 X 1024 Pixels (Default) M213_01	P%53#640<┘ P%54#1024<┘ P%C7#640<┘ P%C8#1024<┘

Options:

Programming Code:	***Serial Command:***
1D Bar Codes Only 200 x 1024 Pixels M209_01	P%53#200<┘ P%c7#200<┘
Small 2D Bar Codes 480 x 480 Pixels M210_01	P%53#480<┘ P%54#480<┘ P%C7#480<┘ P%C8#480<┘

Medium 2D Bar Codes

M211_01

P%53#512<┘
P%54#512<┘
P%C7#512<┘
P%C8#512<┘

Large 2D Bar Codes

M212_01

P%53#640<┘
P%54#640<┘
P%C7#640<┘
P%C8#640<┘

Command Name: **VGA & SXGA Mode**

Usage: Sets the imager optical resolution.

Description: User's may optimize the LH2's mega pixel (SXGA) imager (1280 x 1024) to a VGA (640 x 480). This feature is used to decrease the pixel sampling area, which will greatly increase processing speed. This is an advanced feature used for the rapid decoding of 1D/linear barcodes and larger size 2D barcodes. Opticon recommends testing this feature, as it may not work with certain high density codes.

Default: Optical resolution is set to 1280 x 1024

Programming Code:	***Serial Command:***
SXGA Mode - 1280 x 1024 (Default)	P%e20<┘ P%640<┘

M201_02

Options:

Programming Code:	***Serial Command:***
VGA Mode - 640 x 480	P%e21<┘ P%640<┘

M202_02

Prefix & Suffix Settings

Command Name: **Prefix Settings**

Usage: Sets the prefix for a bar code.

Description: Scan the following barcodes to set appropriate prefix. Make sure to save settings on your reader before scanning the prefix barcodes. If you scan more than one prefix you will receive each scanned prefix in your scanned data (i.e. If you scan comma prefix twice, you will get two comma prefixes).

Default: There is no prefix by default.

Programming Code:	***Serial Command:***
Erase Prefix (No Prefix) M404_01	---

Options:

Programming Code:	***Serial Command:***
Prefix - Comma M159_02	---
Prefix - Space M164_02	---
P	---

M218_02

Prefix - Carriage Return & Line Feed ---

M214_02

Note: For custom prefix commands or to create serial commands for the above settings download the Prefix-Suffix Builder program from Opticon, Inc website at http://www.opticonusa.com.

Command Name: **Suffix Settings**

Usage: Sets the suffix for a bar code.

Description: Scan the following barcodes to set appropriate suffix. Make sure to save settings on your reader before scanning the suffix barcodes. If you scan more than one suffix you will receive each scanned suffix in your scanned data (i.e. If you scan comma suffix twice, you will get two comma suffixes).

Default: There is no suffixe by default.

Programming Code:	***Serial Command:***
Erase Suffix (No Suffix)	**---**

M405_01

Options:

Programming Code:	***Serial Command:***
Suffix - Comma	**---**

M160_02

Programming Code:	***Serial Command:***
Suffix - Space	**---**

M165_02

Suffix - Tab ---

M219_02

Suffix - Carriage Return ---

M168_02

Suffix - Line Feed ---

M169_02

Suffix - Carriage Return & Line Feed ---

M170_02

Note: For custom suffix commands or to create serial commands for the above settings download the Prefix-Suffix Builder program from Opticon, Inc website at http://www.opticonusa.com.

Command Name: **Optimization Matrix**

Usage: Sets the imager to read different sizes of barcodes.

Description: By setting a few parameters of the imager you can take advantage of the dual path imager to read barcodes of different sizes. For your convenience there are some preset standard settings created to read different variety of barcodes. Look at the charts on the next page to assess your environment.

More details are in Chapter 3, sub topic "4) Imager Field of View & Resolution".

Default: The B1 non continuos mode setting is the default.

Note:

1. The tables on the next page represents the settings for each cell.

2. On the following pages there are 2 sets of tables (4 tables altogether).

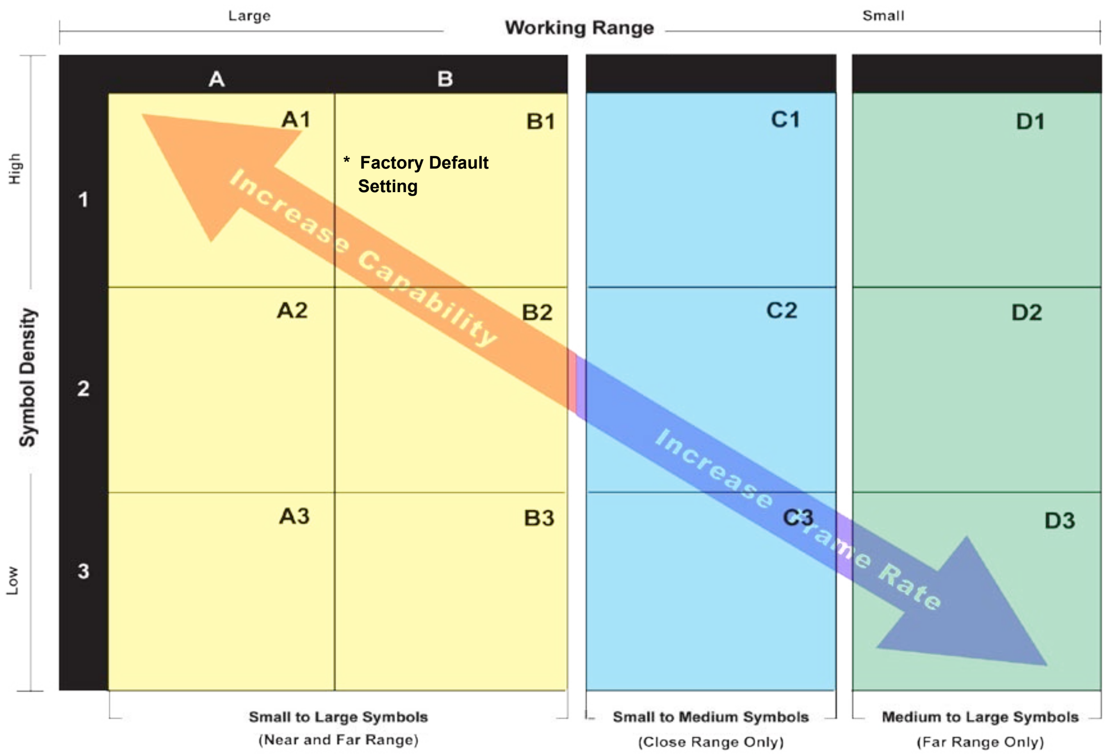
3. The first set is the setting for single trigger and the second set is for continuous trigger.

4. In each set one table has barcodes and the other table has the corresponding serial commands. For example:

Barcode in cell A1 from SET 1 = Serial command in cell A1 from SET 1.

5. All the serial commands have a carriage return at the end of each line.

6. If you use commands from SET 2 - "Continuous trigger" then you can turn OFF the continuous trigger by using the "Continuous Scan OFF" command.



* All triggers programmed to this setting at shipment

Working Range: Large → Small

Symbol Density: High (1) → Low (3)

Symbol Density	A	B	C	D
1 (High)	**A1** **SXGA Mode** **Near Field Decoding:** On **Far Field Decoding:** On **NF Resolution:** 1024 x 640 **FF Resolution:** 1024 x 640 **Decode Try Time:** Long	**B1** **SXGA Mode** **Near Field Decoding:** On **Far Field Decoding:** On **NF Resolution:** 1024 x 640 **FF Resolution:** 1024 x 640 **Decode Try Time:** Normal *** Factory Default Setting**	**C1** **SXGA Mode** **Near Field Decoding:** On **Far Field Decoding:** Off **NF Resolution:** 1024 x 640 **FF Resolution:** NA **Decode Try Time:** Normal	**D1** **SXGA Mode** **Near Field Decoding:** Off **Far Field Decoding:** On **NF Resolution:** NA **FF Resolution:** 1024 x 640 **Decode Try Time:** Normal
2	**A2** **SXGA Mode** **Near Field Decoding:** On **Far Field Decoding:** On **NF Resolution:** 832 x 640 **FF Resolution:** 1024 x 640 **Decode Try Time:** Normal	**B2** **SXGA Mode** **Near Field Decoding:** On **Far Field Decoding:** On **NF Resolution:** 640x 512 **FF Resolution:** 832 x 640 **Decode Try Time:** Short	**C2** **SXGA Mode** **Near Field Decoding:** On **Far Field Decoding:** Off **NF Resolution:** 640 x 640 **FF Resolution:** NA **Decode Try Time:** Normal	**D2** **SXGA Mode** **Near Field Decoding:** Off **Far Field Decoding:** On **NF Resolution:** NA **FF Resolution:** 832 x 512 **Decode Try Time:** Normal
3 (Low)	**A3** **SXGA Mode** **Near Field Decoding:** On **Far Field Decoding:** On **NF Resolution:** 480 x 480 **FF Resolution:** 640 x 480 **Decode Try Time:** Short	**B3** **VGA Mode** **Near Field Decoding:** On **Far Field Decoding:** On **NF Resolution:** 480 x 320 **FF Resolution:** 480 x 320 **Decode Try Time:** Short	**C3** **VGA Mode** **Near Field Decoding:** On **Far Field Decoding:** Off **NF Resolution:** 480 x 320 **FF Resolution:** NA **Decode Try Time:** Short	**D3** **VGA Mode** **Near Field Decoding:** Off **Far Field Decoding:** On **NF Resolution:** NA **FF Resolution:** 480 x 320 **Decode Try Time:** Short
	Small to Large Symbols **Near and Far Range** (A–B)		**Small to Medium Symbols** **(Close Range Only)**	**Medium to Large Symbols** **(Far Range Only)**

*** All triggers programmed to this setting at shipment**

SET 1 - Barcodes for a Single Trigger

Working Range: Large ← → Small

Symbol Density: High (1) ← → Low (3)

	A	B	C	D
1	A1 M001_01	B1 * Factory Default M004_01	C1 M007_01	D1 M010_01
2	A2 M002_01	B2 M005_01	C2 M008_01	D2 M011_01
3	A3 M003_01	B3 M006_01	C3 M009_01	D3 M012_01
	Small to Large Symbols Near and Far Range		Small to Medium Symbols (Close Range Only)	Medium to Large Symbols (Far Range Only)

SET 1 - Serial Commands for a Single Trigger

Working Range: Large ← → Small

Symbol Density: High (1) ← → Low (3)

	A	B	C	D
1	A1 P%3C0D P%3a0D P%390D	B1 P%3C11 P%3a11 P%3911	C1 P%3C14 P%3a14 P%3914	D1 P%3C17 P%3a17 P%3917
2	A2 P%3C0E P%3a0E P%390E	B2 P%3C12 P%3a12 P%3912	C2 P%3C15 P%3a15 P%3915	D2 P%3C18 P%3a18 P%3918
3	A3 P%3C0F P%3a0F P%390F	B3 P%3C13 P%3a13 P%3913	C3 P%3C16 P%3a16 P%3916	D3 P%3C19 P%3a19 P%3919
	Small to Large Symbols Near and Far Range		Small to Medium Symbols (Close Range Only)	Medium to Large Symbols (Far Range Only)

SET 2 - Barcodes for Continuous Trigger

Large — Working Range — Small

Symbol Density: High (1) to Low (3)

	A	B	C	D
1	A1 M079_01	B1 M082_01	C1 M085_01	D1 M088_01
2	A2 M080_01	B2 M083_01	C2 M086_01	D2 M089_01
3	A3 M081_01	B3 M084_01	C3 M087_01	D3 M090_01
	Small to Large Symbols Near and Far Range		Small to Medium Symbols (Close Range Only)	Medium to Large Symbols (Far Range Only)

SET 2 - Serial Commands for Continuous Trigger

Large — Working Range — Small

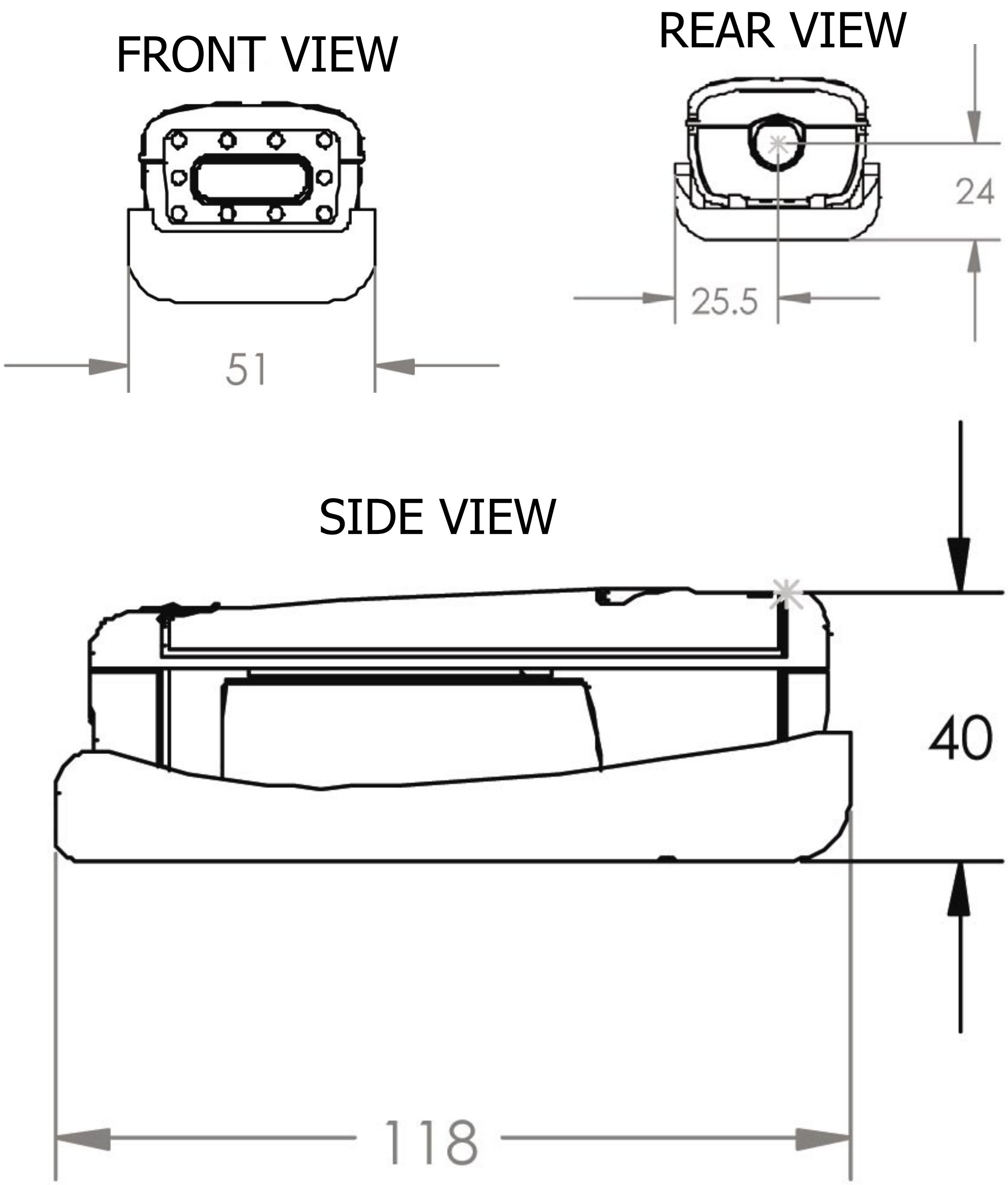
Symbol Density: High (1) to Low (3)

	A	B	C	D
1	A1 P%C40D	B1 P%C411	C1 P%C414	D1 P%C417
2	A2 P%C40E	B2 P%C412	C2 P%C415	D2 P%C418
3	A3 P%C40F	B3 P%C413	C3 P%C416	D3 P%C419
	Small to Large Symbols Near and Far Range		Small to Medium Symbols (Close Range Only)	Medium to Large Symbols (Far Range Only)

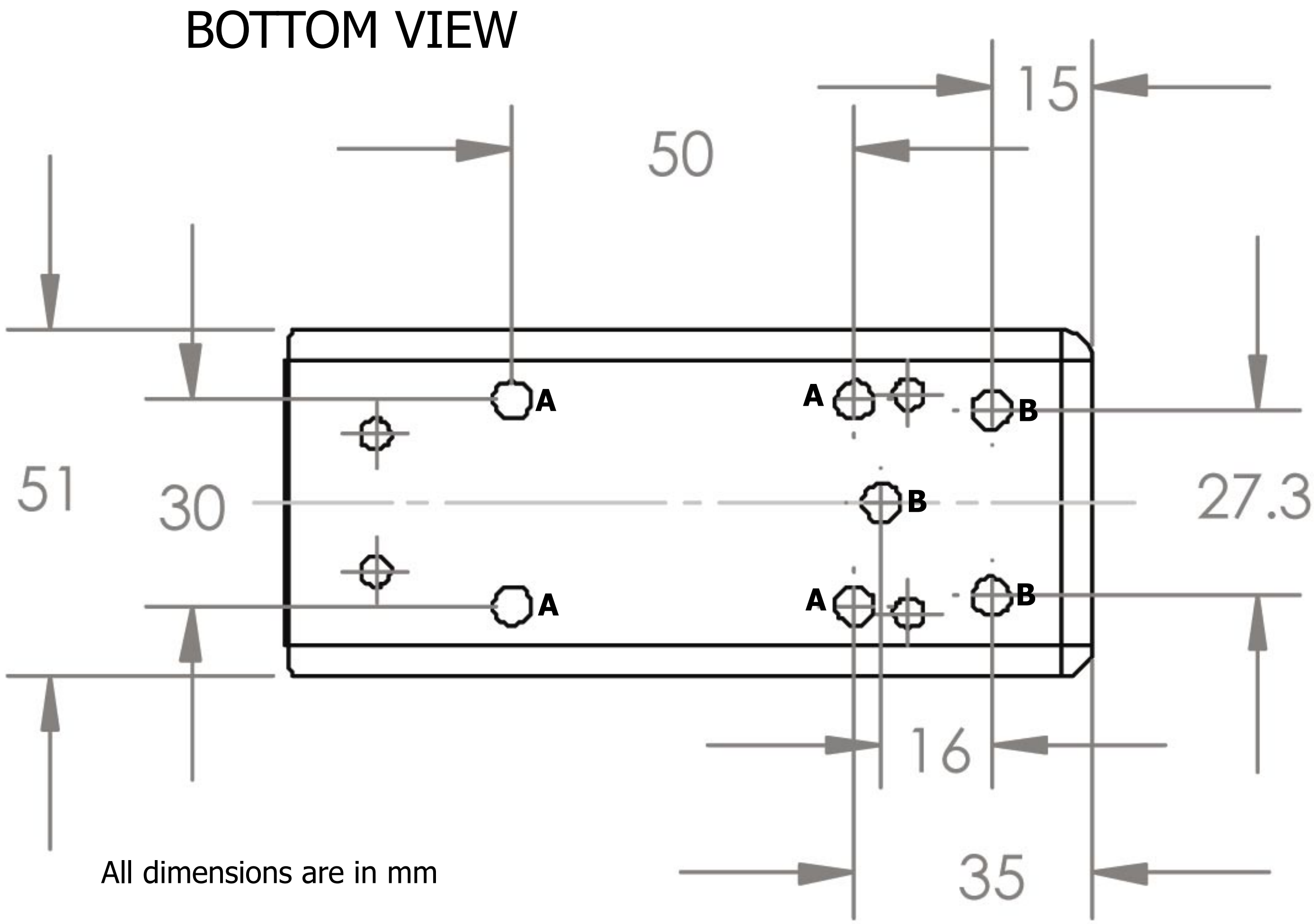


Appendix B

Mechanical Layout



Mechanical Layout



A = Four A type mounting holes represent the Opticon standard bracket.

B = Three B type mounting holes represent the optional Industry standard bracket.

Model LH2RRIS-056 uses type A mounting holes.

Model LH2RRIS-256 uses type B mounting holes.

Diameter of A & B = 5.64 mm (0.222 in)

Only type A or B mounting holes are available on the bracket when shipped from Opticon.